Electronic Transitions $B0_u \leftarrow X0_g$ and Bandhead Fitting for $^{130}Te_2$ from 22155 cm^{-1} to 22555 cm^{-1}

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Outline

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II. Experimental Setup

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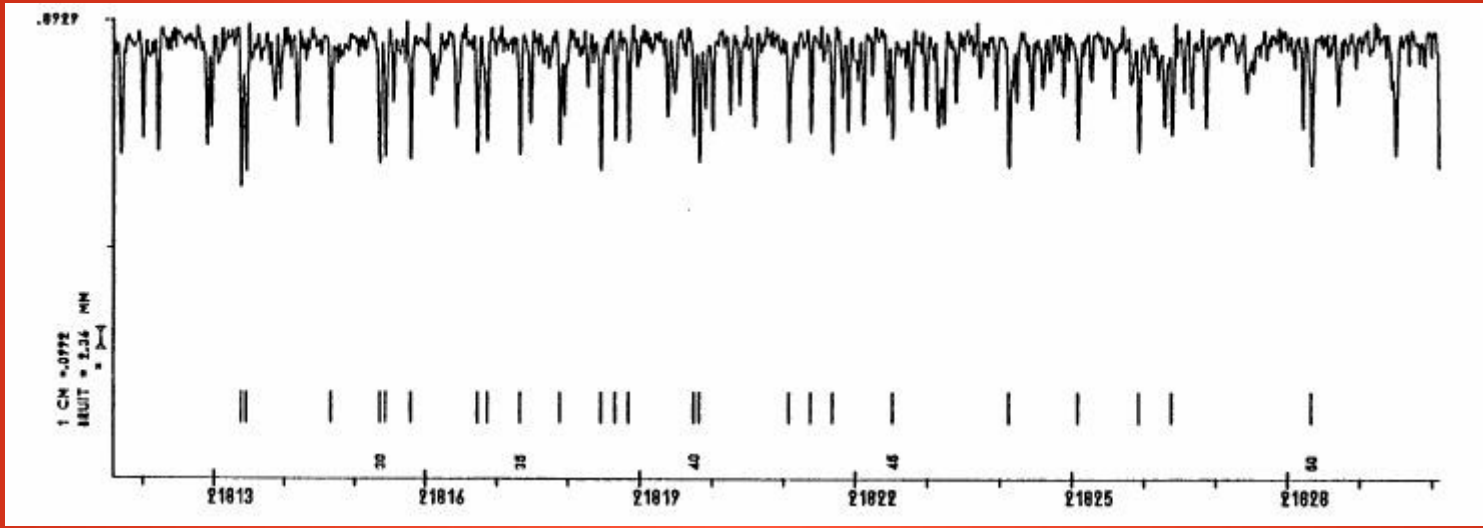
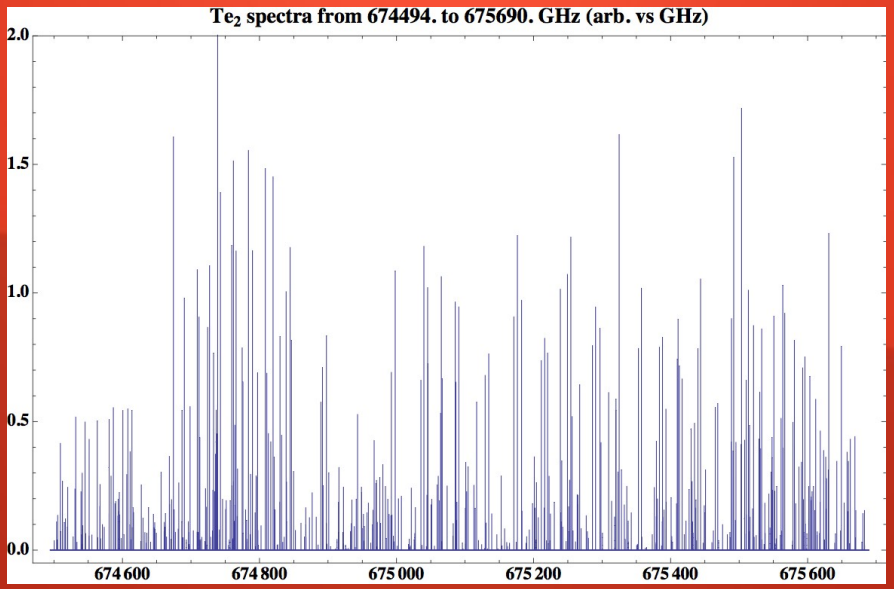
VI. Conclusion

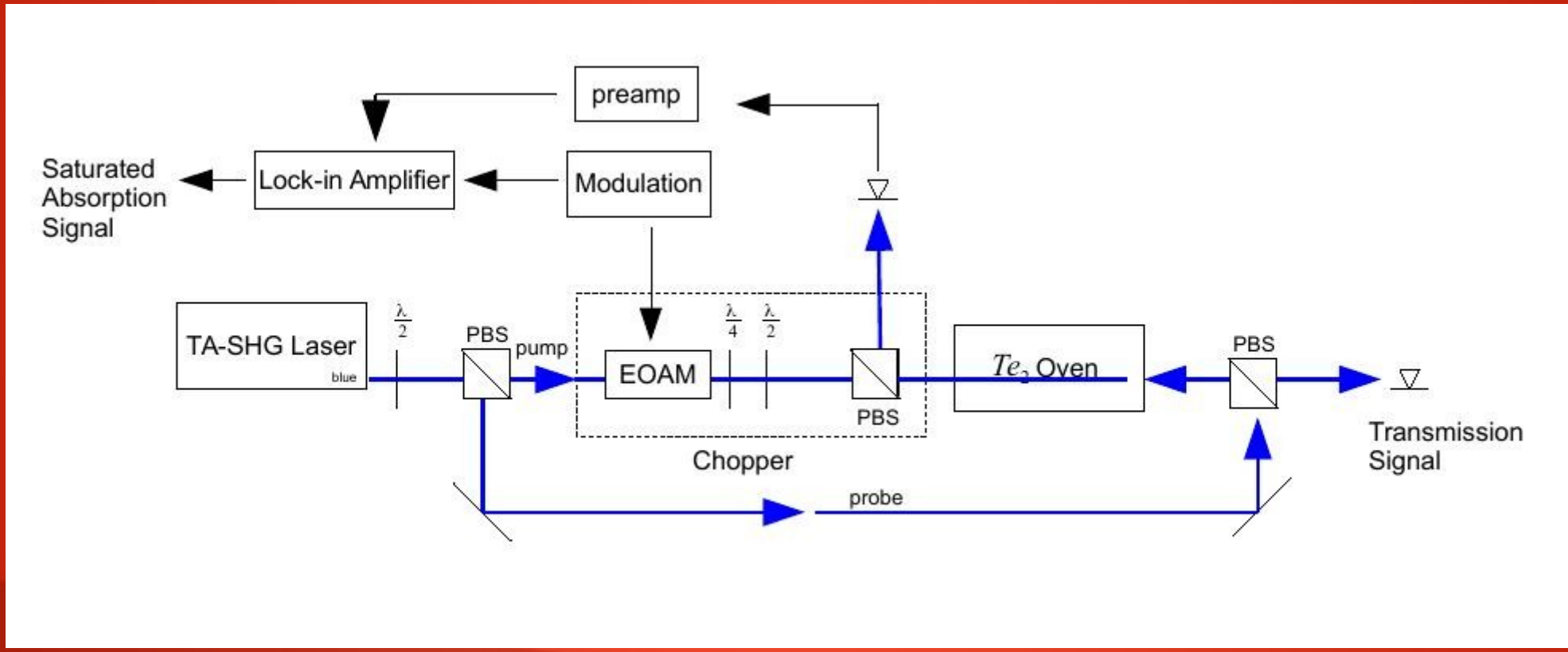
Previous Work



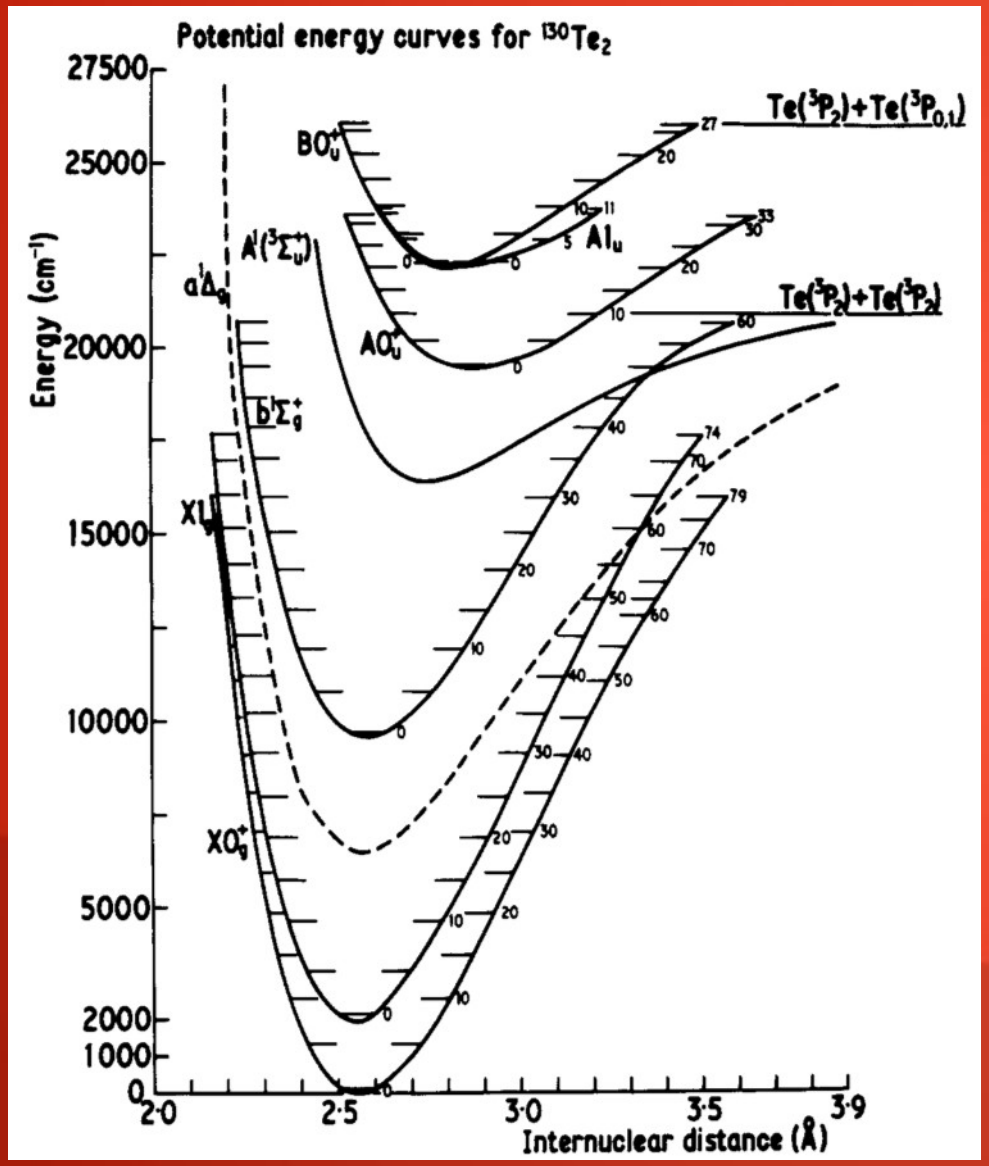
Cariou, J. and Luc, P. "Atlas Du Spectre D'Absorption De La Molecule De Tellure." Laboratoire Aime, Cotton CNRS II 91405 Orsay, France. 1980.



Experimental Setup



Hamiltonian



$$E \approx T_e + G_\nu + F_\nu(J)$$

$$F_\nu = B_\nu J(J+1) - D_\nu J^2(J+1)^2 + H_\nu J^3(J+1)^3$$

$$G_\nu = \omega_e\left(\nu+\frac{1}{2}\right) - \omega_e x_e\left(\nu+\frac{1}{2}\right)^2 + \omega_e y_e\left(\nu+\frac{1}{2}\right)^3 + \omega_e z_e\left(\nu+\frac{1}{2}\right)^4 + \ldots$$

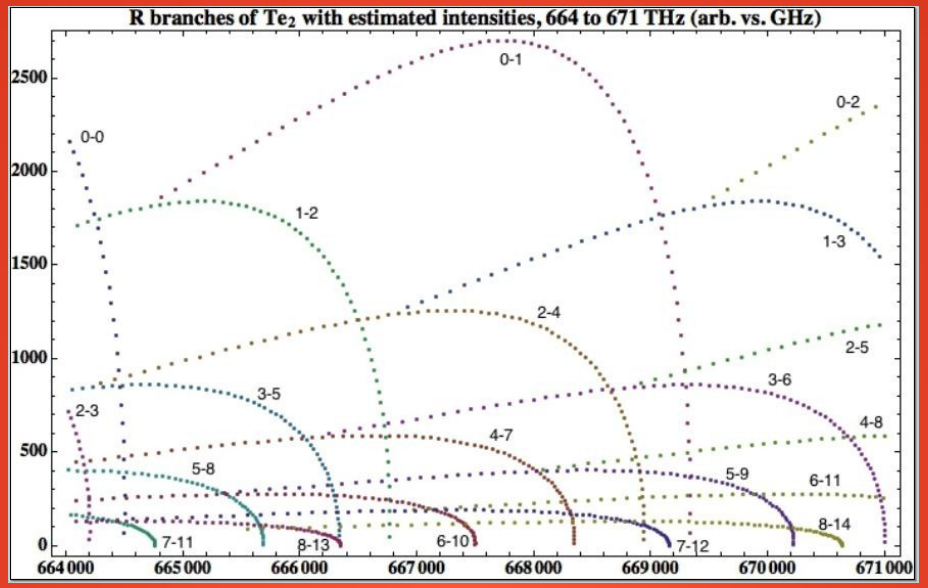
$$B_\nu = B_e - \alpha_e\left(\nu+\frac{1}{2}\right) + \gamma_{e_1}\left(\nu+\frac{1}{2}\right)^2 + \ldots$$

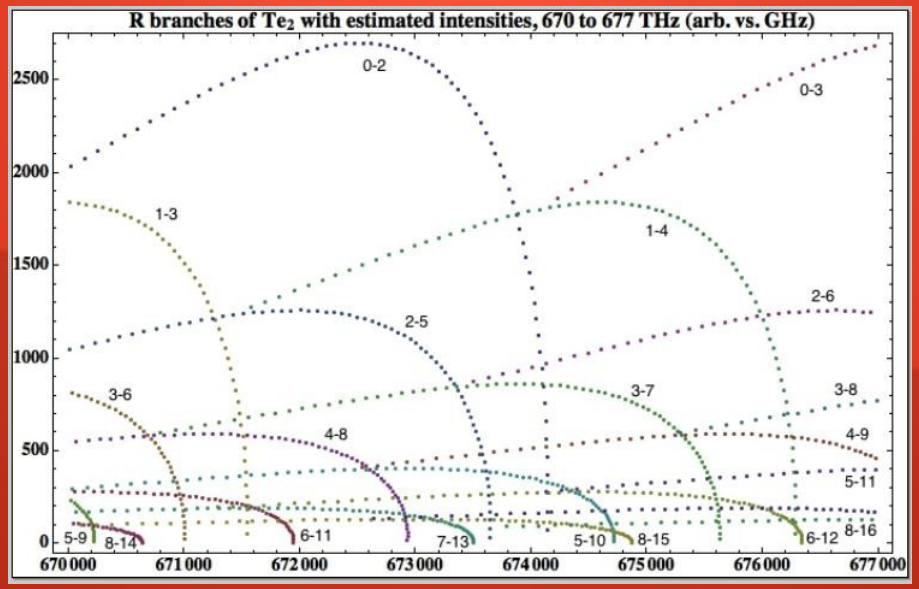
$$D_\nu = D_e + \beta_{e_1}\left(\nu+\frac{1}{2}\right) + \beta_{e_2}\left(\nu+\frac{1}{2}\right)^2 + \ldots$$

$$H_\nu = H_e + g_1\left(\nu+\frac{1}{2}\right) + g_2\left(\nu+\frac{1}{2}\right)^2 + \ldots$$

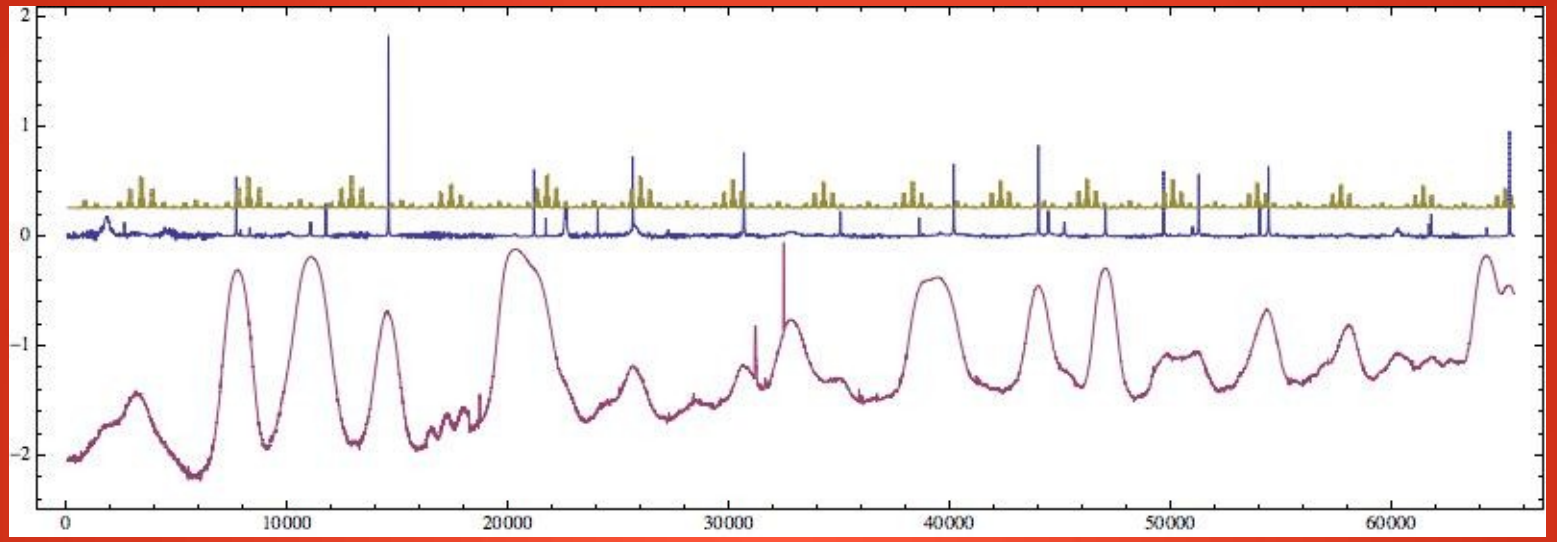
Verges, J. "The Laser Induced Fluorescence Spectrum of Te2 Studied by Fourier Transformation Spectrometry. *Physica Scripta*. Vol. 25, 338-350, 1982.

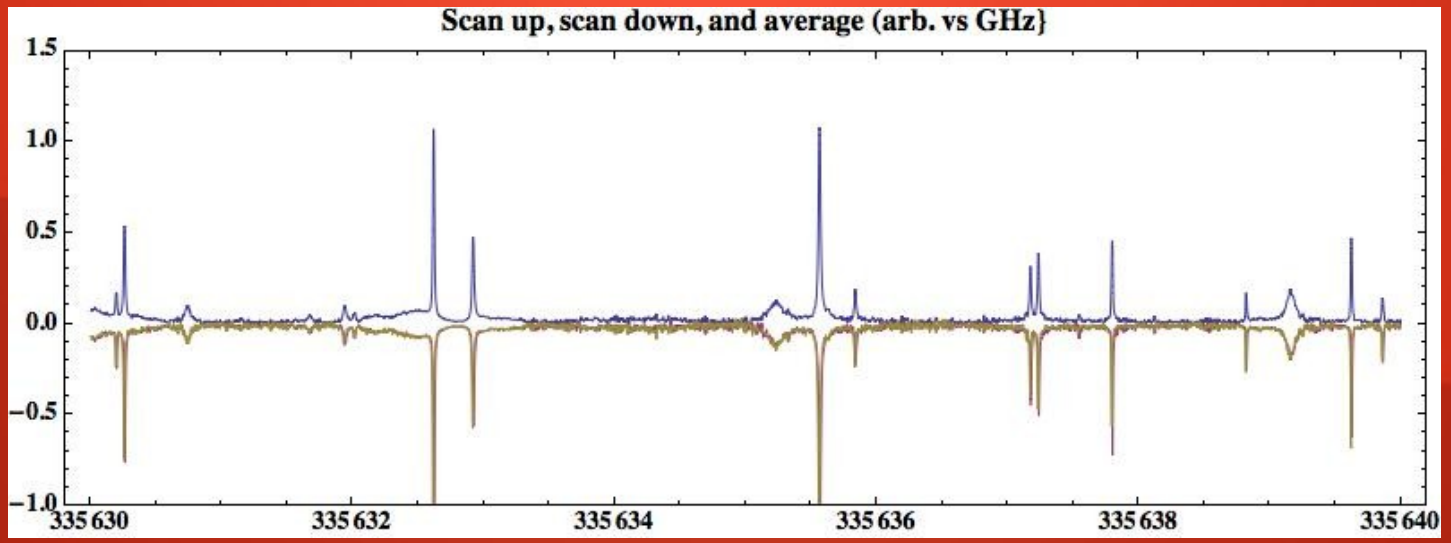
Bandheads


R branches of Te2 with estimated intensities, 664 to 671 THz (arb. vs. GHz)
0-1
0-2
0-0
1-2
1-3
2-4
2-5
3-6
3-5
2-3
4-8
4-7
5-8
5-9
6-11
8-14
7-11
8-13
6-10
7-12
2500
2000
1500
1000
500
0
664 000
665 000
666 000
667 000
668 000
669 000
670 000
671 000

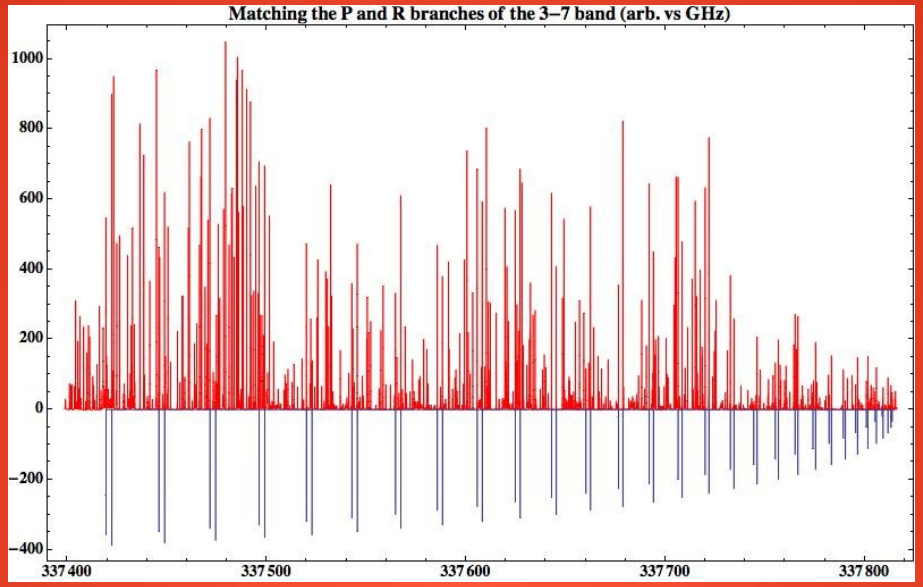

R branches of Te2 with estimated intensities, 670 to 677 THz (arb. vs. GHz)
0-2
0-3
1-3
1-4
2-6
2-5
3-6
3-7
3-8
4-8
4-9
5-11
5-9
8-14
6-11
7-13
5-10
8-15
6-12
8-16
2500
2000
1500
1000
500
0
670 000
671 000
672 000
673 000
674 000
675 000
676 000
677 000

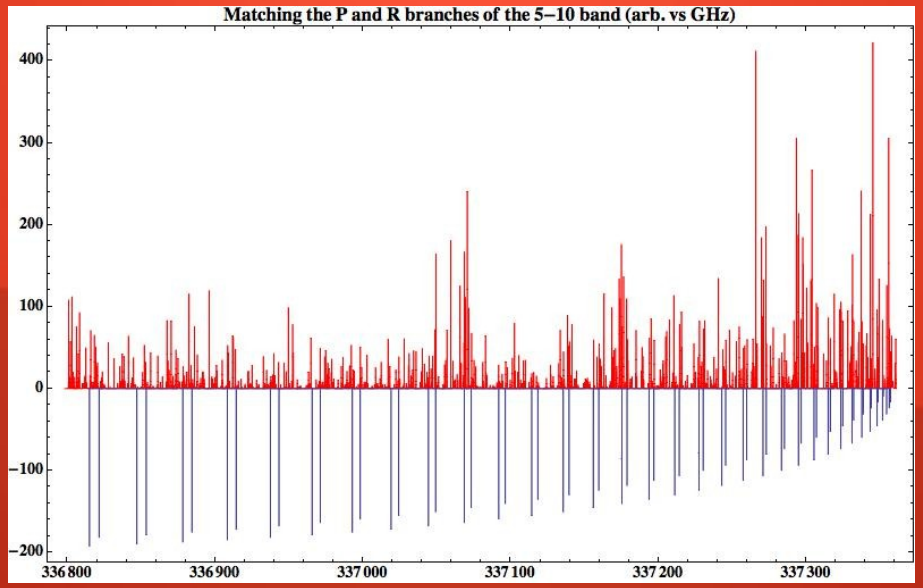
Scanning


2
1
0
−1
−2
0
10000
20000
30000
40000
50000
60000


Scan up, scan down, and average (arb. vs GHz)
1.5
1.0
0.5
0.0
−0.5
−1.0
335 630
335 632
335 634
335 636
335 638
335 640

Fitting Lines





Preliminary Constants

TABLE 1. B0 state constants measured (cm^{-1}):

v	G_v	B_v	D_v	H_v
4	719.865(5)	0.031979(3)	$2.6(3) \times 10^{-8}$	$2(1) \times 10^{-12}$
5	877.015(1)	0.031826(2)	$2.4(1) \times 10^{-8}$	$2(1) \times 10^{-12}$
6	1032.898(1)	0.0316155(5)	$2.4(2) \times 10^{-8}$	$1(1) \times 10^{-12}$
7	1187.2989(3)	0.0316963(3)	$1.623(9) \times 10^{-8}$	$4.67(6) \times 10^{-13}$
9	1491.647(2)	0.0312975(7)	$1(1) \times 10^{-8}$	$3(2) \times 10^{-13}$
10	1641.5385(1)	0.031049(2)	$2.6(1) \times 10^{-8}$	$2(1) \times 10^{-13}$
11	1936.491(1)	0.030891(3)	$3(2) \times 10^{-8}$	$1(1) \times 10^{-13}$

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Questions?